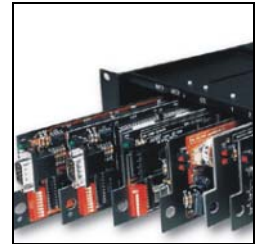




instruction manual

AXB-DTMF+

DTMF+ Interface



AXlink Bus Controllers

AMX Limited Warranty and Disclaimer

AMX Corporation warrants its products to be free of defects in material and workmanship under normal use for three (3) years from the date of purchase from AMX Corporation, with the following exceptions:

- Electroluminescent and LCD Control Panels are warranted for three (3) years, except for the display and touch overlay components that are warranted for a period of one (1) year.
- Disk drive mechanisms, pan/tilt heads, power supplies, MX Series products, and KC Series products are warranted for a period of one (1) year.
- Unless otherwise specified, OEM and custom products are warranted for a period of one (1) year.
- Software is warranted for a period of ninety (90) days.
- Batteries and incandescent lamps are not covered under the warranty.

This warranty extends only to products purchased directly from AMX Corporation or an Authorized AMX Dealer.

AMX Corporation is not liable for any damages caused by its products or for the failure of its products to perform. This includes any lost profits, lost savings, incidental damages, or consequential damages. AMX Corporation is not liable for any claim made by a third party or by an AMX Dealer for a third party.

This limitation of liability applies whether damages are sought, or a claim is made, under this warranty or as a tort claim (including negligence and strict product liability), a contract claim, or any other claim. This limitation of liability cannot be waived or amended by any person. This limitation of liability will be effective even if AMX Corporation or an authorized representative of AMX Corporation has been advised of the possibility of any such damages. This limitation of liability, however, will not apply to claims for personal injury.

Some states do not allow a limitation of how long an implied warranty last. Some states do not allow the limitation or exclusion of incidental or consequential damages for consumer products. In such states, the limitation or exclusion of the Limited Warranty may not apply. This Limited Warranty gives the owner specific legal rights. The owner may also have other rights that vary from state to state. The owner is advised to consult applicable state laws for full determination of rights.

EXCEPT AS EXPRESSLY SET FORTH IN THIS WARRANTY, AMX CORPORATION MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. AMX CORPORATION EXPRESSLY DISCLAIMS ALL WARRANTIES NOT STATED IN THIS LIMITED WARRANTY. ANY IMPLIED WARRANTIES THAT MAY BE IMPOSED BY LAW ARE LIMITED TO THE TERMS OF THIS LIMITED WARRANTY.

Table of Contents

Product Information	1
Specifications	1
Configuration and Installation	3
Setting the Internal Jumpers	3
Auto Answer mode	3
Line Setting mode	4
Wiring the AXB-DTMF+	4
Preparing captive wires	4
Wiring guidelines	4
Connecting External Telephone Lines	5
Audio In	5
Audio Out	5
Testing the AXB-DTMF+	6
Off-hook line and off-hook phone troubleshooting	6
Programming	7
Send_Commands	7
Operative Send_Commands	7
Timing System Send_Commands	10
Fine Tuning Send_Commands	14
Distinctive Ring Patterns and Send_Commands	15
Changing a Default Ring Pattern	16
Distinctive Ring Send_Commands	17
Access Program Example	18
Channel Codes	22
Caller ID	24
Program Example for Caller ID	24

Product Information

The AXB-DTMF+ DTMF Interface (FIG. 1) links an Access central controller to a telephone network, enabling dual tone multi-frequency (DTMF) and audio pass-through control. The AXB-DTMF+, with a programmed central controller, processes incoming calls and initiates outgoing calls to any pager or cellular phone.

The multi-function AXB-DTMF+ can be integrated for many imaginative and creative purposes within a home or work environment using touch-tone control. For example, the AXB-DTMF+ can announce callers by caller ID data, or can set up an audible menu selection to process incoming calls for routing.

The audio pass-through can be used with an AXC-SPE Enhanced Speech Synthesizer card, or PC sound card to produce audible menus, monitor phone audio, or provide audio input such as music on hold. The AXB-DTMF+ allows a user to issue instructions to the AMX Central controller from a remote location using any touch-tone telephone.

The AXB-DTMF+ receives and decodes DTMF audio signaling and sends the decoded data to the central controller for the switching/controlling of any devices connected to the central controller. An Access program written on a personal computer, and downloaded to the central controller, enables the central controller to interpret the data received from the AXB-DTMF+. The program may also issue menu selections over the telephone through an optional AXC-SPE card. For more information about programming a central controller, refer to the Access Programming Guide.

Specifications

The following table lists the product specifications for the AXB-DTMF+.

AXB-DTMF+ Specifications	
Power requirement	12 VDC
Power consumption	80 mA
DTMF+ Monitoring	The AXB-DTMF+ can monitor DTMF signals only when in an off-hook state or when a phone attached to the extension connection is taken off-hook.
Incoming signal detection	<ul style="list-style-type: none"> • DTMF tones • Ring • Distinctive ring • Caller ID
Outgoing signal detection	<ul style="list-style-type: none"> • DTMF tones • Ring • Busy • Call termination • Dial tone
Hardware state detection	Detects if the AXB-DTMF+ is off-hook, or if the extension phone is off-hook.
Control	Provides control for: <ul style="list-style-type: none"> • AXB-DTMF+ off-hook/hangup • Auto answer • Extension phone on/disable • Audio to telephone, and telephone to audio pass-through coupling

AXB-DTMF+ Specifications (Cont.)	
Operation modes (set via internal jumpers):	<ul style="list-style-type: none"> • Auto Answer • Line Type Refer to <i>Setting the Internal Jumpers</i> section on page 3 for details.
Front panel components (FIG. 1):	
AXlink LED	Blinks on and off to indicate that the AXB-DTMF+ is communicating with the central controller.
Off Hook Phone LED	Lights when ever a telephone connected to the PHONE connector on the AXB-DTMF+ is in an off-hook condition. The OFF HOOK PHONE LED only functions when the telephone line is connected directly to the AXB-DTMF+.
Off Hook Line LED	Lights when the AXB-DTMF+ is taken off-hook. The OFF HOOK LINE LED only functions when the telephone line is connected directly to the AXB-DTMF+.
Ring LED	Lights when an incoming call ring is detected.
DTMF RX LED	Lights when the AXB-DTMF+ is receiving DTMF signals.
DTMF TX LED	Lights when the AXB-DTMF+ is transmitting DTMF signals out.
Rear panel components:	
Phone connector	This RJ-11 connector is used for attaching a telephone.
Line connector	This RJ-11 input connects the incoming telephone line to the AXB-DTMF+.
Audio In	RCA connector that provides unbalanced line level audio input signals for coupling to the telephone line signals for coupling to the telephone line..
Audio Out	RCA connector that provides an output for unbalanced line level (1V p-p) audio signals coupled from coupled from the telephone line.
AXlink	4-pin captive-wire connector that provides power and communications with the Access central controller.
Weight	1.0 lbs (454.0 g)
Dimensions (HWD)	1.51" x 5.55" x 6.45" (38.4 mm x 141 mm x 165 mm)
Mounting options	<ul style="list-style-type: none"> • Flat mount • Rack mount (using an optional AC-RK accessory rack kit).

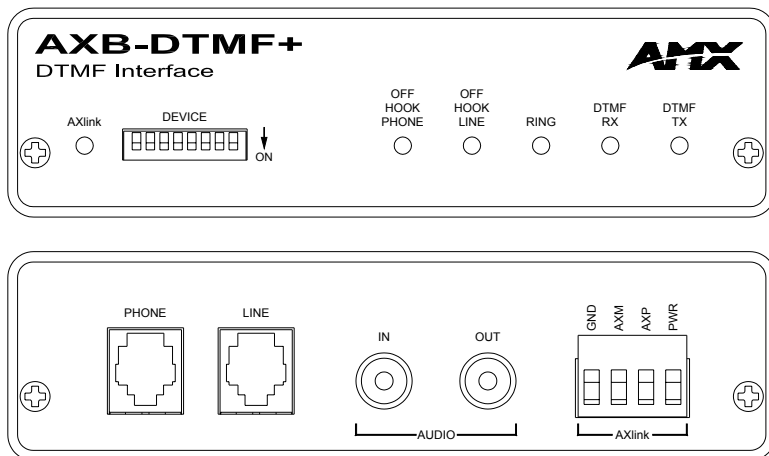


FIG. 1 Front and rear views of the AXB-DTMF+

Configuration and Installation

Setting the Internal Jumpers

There are two 2-position jumpers on the AXB-DTMF+ circuit card (FIG. 1). Each jumper is set to a default pin setting. These jumpers are positioned to enable automatic call answering and select line setting for a leased line or phone operation.

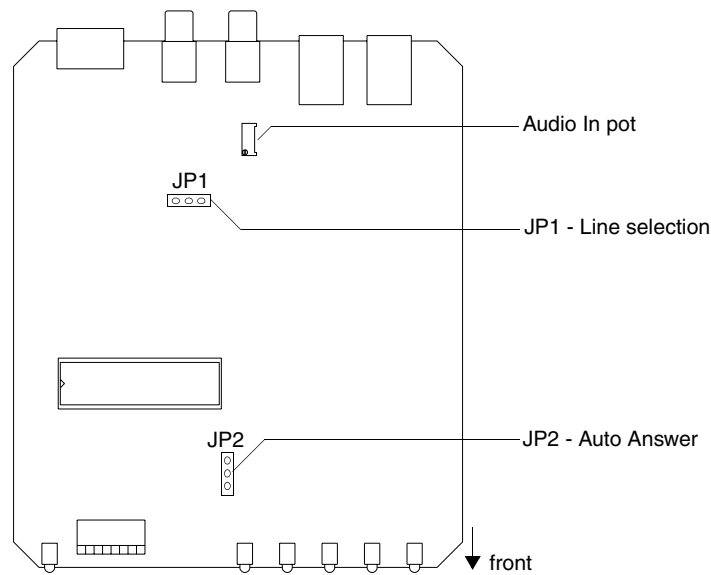


FIG. 1 Location of JP1, JP2 jumpers, and Audio In potentiometer.

Auto Answer mode

The 2-position jumper JP2 selects auto answer ON or OFF mode when the system powers on. When the auto answer is on, the AXB-DTMF+ answers on the ring set by the Send_Command COUNT-XXX. If the ring count is set to 3, for example, auto answer picks up the call after the third ring. The default count is 1 ring. The default jumper setting is shown in FIG. 2.

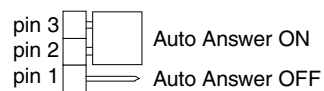


FIG. 2 Auto answer jumper JP2 (default setting = Auto Answer ON)

To change the auto answer default from ON to OFF:

1. Remove the AXB-DTMF+ unit cover.
2. Remove the jumper from pins 2 and 3, and place it on pins 1 and 2.
3. Re-install the AXB-DTMF+ cover onto the unit housing.

Line Setting mode

The 2-position jumper JP1 selects PHONE or LEASED line operation when system powers on. FIG. 3 shows the default setting.

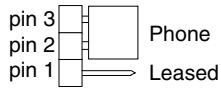


FIG. 3 Line Setting jumper JP1 (default setting = PHONE)

To change the line setting default from PHONE to LEASED:

1. Remove the AXB-DTMF+ cover from the unit housing.
2. Remove the jumper from pins 2 and 3, and place it on pins 1 and 2.
3. Re-install the AXB-DTMF+ cover onto the unit housing.

Wiring the AXB-DTMF+

Preparing captive wires

To connect the wiring into a captive-wire connector:

1. Strip 1/4 inch off the wire insulation for all four wires.
2. Tin 2/3 of the exposed wire.
3. Insert each wire into the appropriate captive-wire connector up to the insulation.
4. Tighten the captive screws to secure the fit in the connector.



If the device is using a separate power supply, do not connect the power wiring from the AXB-DTMF+ to that device.

Wiring guidelines

The interface requires a 12 VDC power to operate properly. The interface uses a PSN2.8 power suppl. The Central Controller supplies power via the AXlink cable or external 12 VDC power supply. The maximum wiring distance between the Central Controller and interface is determined by power consumption, supplied voltage, and the wire gauge used for the cable. The table below lists wire sizes and maximum lengths allowable between the AXB-DTMF+ and Central Controller. The maximum wiring lengths for using AXlink power are based on a minimum of 13.5 volts available at the Central Controller’s power supply.

Wiring Guidelines at 80 mA	
Wire Size	Maximum Wiring Length
18 AWG	1467.14 feet (447.18 m)
20 AWG	928.22 feet (282.92 m)
22 AWG	578.70 feet (176.39 m)
24 AWG	364.79 feet (111.19 m)

Connecting External Telephone Lines

Telephone cabling for both the input and extension lines are standard RJ-11 type connections. Follow these steps to connect external telephone lines.



NOTE

Cables and connectors for telephone and audio hook-up are not included with the AXB-DTMF+.

1. Check the circuit card jumper settings to match line type and auto answer mode. For more information, refer to AXB-DTMF+ Jumpers in the Pre-Installation section of this manual.
2. Connect the AXlink cable to the Access Central controller AXlink input.
3. Connect the male RJ-11 jack of the incoming telephone line input to the AXB-DTMF+ LINE jack and the extension telephone cable to the PHONE jack on the rear of the AXB-DTMF+.
4. Adjust the AUDIO OUT level by referring to the Audio Pass-Through Level paragraphs in this section.

Audio In

The audio in is provided for music on hold or for voice menu selections if connected. If the audio volume is too low or too high, the audio in level needs to be adjusted. Increase or decrease the audio in pass-through level (gain) from the AXB-DTMF+. The AUDIO IN pot is located about mid-center on the AXB-DTMF+ circuit board (see FIG. 1). Perform these steps to adjust the audio in level.



NOTE

If audio is connected to the AXB-DTMF+, make sure the audio is turned on by using the correct Send_Commands. Refer to the Access Programming section.

1. Remove the AXB-DTMF+ cover from the unit housing. Then, apply an audio signal (1 V p-p maximum) to the AUDIO IN connector.
2. Listen on-line and use a small flat-blade screwdriver to turn the pot counter clockwise to reduce audio level from AUDIO IN. Turn the pot clockwise to increase the AUDIO IN level.
3. Re-install the AXB-DTMF+ cover onto the unit housing.

Audio Out

The AUDIO OUT jack provides a means of routing line level signals, which originates on the telephone line to an external device such as a sound card.



NOTE

To prevent "howling", make sure that the AXB-DTMF+ AUDIO IN and AUDIO OUT lines are not looped back through an external device.

Testing the AXB-DTMF+

Follow these steps to test the AXB-DTMF+:

1. Disconnect AXlink power.
2. Remove the cover from the unit housing and set the AUTO ANSWER jumper to AUTO ANSWER ON then reinstall the cover on the unit housing.
3. Reconnect AXlink power. The status LEDs should blink in sequence from right to left and the AXlink green LED should be blinking.
4. Place a call to the AXB-DTMF+ from an outside line.
5. The RING LED should light with an incoming ring.
6. The OFF HOOK LINE LED should light after 1 ring.
7. The DTMF RX LED should light when tones are sent from the calling telephone.
8. Check line quality and operation using an extension telephone connected to the PHONE jack.
9. Return the AUTO ANSWER jumper to OFF position, if desired.

Off-hook line and off-hook phone troubleshooting

The off-hook line and off-hook phone LEDs light only if there is a good telephone line connection. If either the off-hook line or off-hook phone LED fails to light, a faulty telephone line connection is indicated.

Make sure a proper phone line connection exists to light both off-hook and extension off-hook LEDs. Test the off-hook line by following these test procedures:



NOTE

The extension telephone is optional and supplied by the user.

1. Take the AXB-DTMF+ off-hook by issuing the off-hook Send_Command from the central controller. If there is a good telephone line connection, then the OFF HOOK LINE LED lights.
2. If the OFF HOOK LINE LED fails to light, then there is a bad or faulty telephone line connection. Check the incoming telephone line and make sure it is working properly. Then, check the RJ-11 cable and its connection to the AXB-DTMF+.

Test the off-hook phone using the following steps:

1. Take the receiver off the extension telephone. If there is a good telephone line connection, then the EXTENSION OFF HOOK LED lights.
2. If the OFF HOOK PHONE LED fails to activate, make sure that an extension off-hook Send_Command has not been issued (you can do a Send_Command extension on-hook to be sure; see the *Operative Send_Commands* section on page 7 for details). If this does not produce results, then there is a faulty telephone line connection. Check the incoming telephone line and make sure it is working properly. Then, check the RJ-11 cable and its connection to the AXB-DTMF+. Make sure the RJ-11 cable from the extension telephone is good.

Programming

Program the AXB-DTMF+ to send outbound DTMF codes using Access Send_Commands from the control

Fine Tuning - commands allowing experienced users the ability to obtain performance in adverse system. Use the commands described in this section with the Access Programming Guide to program the AXB-DTMF+. The Send_Commands are divided into the following categories:

- **Operative:** normal day-to-day commands controlling the overall operation of the AXB-DTMF+.
- **Timing:** control the AXB-DTMF+ signal timing (not necessary in most situations).conditions.
- **Distinctive Ring:** commands that define distinctive ring patterns.

Send_Commands

Send_Commands are stored in the central controller and direct the AXB-DTMF+ to perform various operations.

Operative Send_Commands

The following table lists Operative Send_Commands that produce control of the AXB-DTMF+. The commands are listed alphabetically by operation and include syntax, syntax descriptions, usage examples, time increments, and reset default values.

Operative System Send_Commands	
Command	Description
AGAIN-OFF	Control gain of the audio (voice) signal from the phone lines to the audio output of the AXB-DTMF+. Setting the gain to off causes it to return to the default level. Default at reset = YES Example: <code>SEND_COMMAND DTMF, 'AGAIN-OFF'</code> Sets the audio gain to low from the AXB-DTMF+ to default (no amplification boost).
AGAIN-ON	Control gain of the audio (voice) signal from the phone lines to the audio output of the AXB-DTMF+. Setting the gain to on increases the gain above the default level. Default at reset = NO Example: <code>SEND_COMMAND DTMF, 'AGAIN-ON'</code> Sets the audio gain from the AXB-DTMF+ to high (amplification boost).
AUDIO-OFF	Disable audio from passing through the AXB-DTMF+ to the phone line. Default at reset = YES Example: <code>SEND_COMMAND DTMF, 'AUDIO-OFF'</code> Disables the audio from passing through the AXB-DTMF+ to the phone line.

Operative System Send_Commands (Cont.)	
Command	Description
AUDIO-ON	<p>Enable audio from passing through the AXB-DTMF+ to the phone line. Default at reset = YES (for backwards compatibility)</p> <p>Example: <code>SEND_COMMAND DTMF, 'AUDIO-ON'</code></p> <p>Enables the audio from passing through the AXB-DTMF+ to the phone line.</p>
AUDOUT-OFF	<p>Disable audio from passing from the phone line to the audio out output of the AXB-DTMF+. Default at reset = NO (for backwards compatibility)</p> <p>Example: <code>SEND_COMMAND DTMF, 'AUDOUT-OFF'</code></p> <p>Disables the audio from passing from the phone line to the audio out output of the AXB-DTMF+.</p>
AUDOUT-ON	<p>Enable audio from passing from the phone line to the audio out output of the AXB-DTMF+. Default at reset = NO</p> <p>Example: <code>SEND_COMMAND DTMF, 'AUDOUT-ON'</code></p> <p>Enables the audio from passing from the phone line to the audio out output of the AXB-DTMF+.</p>
AUTO-ON	<p>Enable the auto answer mode (overrides the auto-answer jumper settings). Default at reset = NO</p> <p>Example: <code>SEND_COMMAND DTMF, 'AUTO-ON'</code></p> <p>Enables the auto answer mode.</p>
AUTO-OFF	<p>Disable auto answer mode (overrides the auto-answer jumper settings). Default at reset = YES</p> <p>Example: <code>SEND_COMMAND DTMF, 'AUTO-OFF'</code></p> <p>Disables the auto answer mode.</p>
COUNT-XXX	<p>Set auto answer ring count. Default at reset = 1</p> <p>Example: <code>SEND_COMMAND DTMF, 'COUNT-4'</code></p> <p>Sets ring count to 4 before the line is answered in auto answer mode.</p>

Operative System Send_Commands (Cont.)	
Command	Description
DIAL-X-XXX-XXXX	<p>Dial number and send DTMF.</p> <ul style="list-style-type: none"> • Spaces or hyphens are ignored when dialing. • A 'W' in the dial command will cause the AXB-DTMF+ to wait for dial tone before dialing the next digit in the dial command. The wait will time out after 2 seconds. If a time out occurs, the AXB-DTMF+ will indicate this by sending a push and release on channel 45. • A ',' in the Dial command will cause the AXB-DTMF+ to pause for a time specified in the Pause Send_Command before dialing the next digit in the command. <p>Example:</p> <pre>SEND_COMMAND DTMF, 'DIAL-9 W 214,644-3048'</pre> <p>Causes the AXB-DTMF+ to dial a 9 and then waits for dial tone before continuing to dial the next three digits. The AXB-DTMF+ pauses for the time specified in the Pause Send_Command before dialing the remaining six digits.</p> <p>Up to 24 characters following Dial are allowed. Characters that generate tones are 0 - 9, *, #, A - D.</p> <p>Note: Tone length is set by the Tone Time Send_Command which sets the length of each generated tone and the time between tones. A pause can be added after a tone, for additional dial time, by using the Pause Send_Command. For more information refer to the 'TONE TIME-XXX ' and 'PAUSE-XXX ' Send_Commands.</p>
EXTEN-OFF	<p>Disable phones which are hanging off the extension phone connection on the AXB-DTMF+ by opening the phone circuit.</p> <p>Default at reset = NO</p> <p>Example:</p> <pre>SEND_COMMAND DTMF, 'EXTEN-OFF'</pre> <p>Disables phones that are hanging off the extension phone connection on the AXB-DTMF+ by opening the phone circuit.</p>
EXTEN-ON	<p>Enable phones that are hanging off the extension phone connection on the AXB-DTMF+ by closing the phone circuit.</p> <p>Default at reset = YES</p> <p>Example:</p> <pre>SEND_COMMAND DTMF, 'EXTEN-ON'</pre> <p>Enables any phones that are hanging off the extension phone connection on the AXB-DTMF+ by closing the phone circuit.</p>
FLASH	<p>Cause flash-hook for a period of time set by the Send_Command FLASH TIME.</p> <p>Example:</p> <pre>SEND_COMMAND DTMF, 'FLASH'</pre> <p>Causes flash-hook for a period of time set by the Send_Command FLASH TIME.</p>
'OFF HOOK	<p>Place AXB-DTMF+ off hook.</p> <p>Default at reset = NO</p> <p>Example:</p> <pre>SEND_COMMAND DTMF, 'OFF HOOK'</pre> <p>Places the AXB-DTMF+ off hook.</p>

Operative System Send_Commands (Cont.)	
Command	Description
ON HOOK	Place AXB-DTMF+ on hook. Default at reset = YES Example: <code>SEND_COMMAND DTMF, 'ON HOOK'</code> Places the AXB-DTMF+ on hook.

Timing System Send_Commands

The following table lists the commands, which establish normal signal timing.



Changing default time values may inadvertently alter the operation of the AXB-DTMF+. It is unnecessary to change most default values.

The commands are listed alphabetically by operation and include syntax, syntax descriptions, usage examples, time increments, and reset default values.

Timing System Send_Commands	
Command	Description
BLOCKRDET-XXX	For telephone lines with distinctive ring feature. Time increment = 10 ms Example: <code>SEND_COMMAND DTMF, 'BLOCKRDET-185'</code> Sets the time to ignore "sub rings " at 1.85 seconds (1850 ms).
FLASH TIME-XXX	Set time AXB-DTMF+ will go "on-hook" when Send_Command FLASH is issued. • Time increment = 10 ms • Default at reset = 63 Example: <code>SEND_COMMAND DTMF, 'FLASH TIME-65'</code> Sets time AXB-DTMF+ will go "on-hook" when Send_Command FLASH is issued for .65 seconds (650 ms).
INROFFMIN-XXX	Minimum time required for an incoming ring to be in the off state to reset ring count on AXB-DTMF+. • Time increment = 100 ms • Default at reset = 45 Example: <code>SEND_COMMAND DTMF, 'INROFFMIN-55'</code> Sets minimum off state time for an incoming ring to 5.5 seconds (5500 ms).
LOSSLCMAX-XXX	The maximum time a loop current is off (used to detect other end hung up). • Time increment = 10 ms • Default at reset = 80 Example: <code>SEND_COMMAND DTMF, 'LOSSLCMAX-90'</code> Sets a .9 second (900 ms) maximum off time for a loop current.

Timing System Send_Commands (Cont.)	
Command	Description
LOSSLCMIN-XXX	<p>The minimum time a loop current is off (used to detect other end hung up).</p> <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 10 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'LOSSLCMIN-15'</pre> <p>Sets a .15 second (150 ms) minimum off time for a loop current.</p>
OBUOFFMAX-XXX	<p>Outgoing busy off time maximum.</p> <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 60 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'OBUOFFMAX-65'</pre> <p>Sets the outgoing busy off time maximum to .65 second (650 ms).</p> <p>For the code to work properly, ring, busy, and reorder time values must be set so that <i>ring</i> is greater than <i>busy</i>, and <i>busy</i> greater than <i>reorder</i> (ring>busy>reorder).</p>
OBUOFFMIN-XXX	<p>Outgoing busy off time minimum.</p> <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 40 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'OBUOFFMIN-45'</pre> <p>Sets the outgoing busy off time minimum to .45 second (450 ms) (see NOTE for Send_Command 'OBUOFFMAX-XXX').</p> <p>For the code to work properly, ring, busy, and reorder time values must be set so that <i>ring</i> is greater than <i>busy</i>, and <i>busy</i> greater than <i>reorder</i> (ring>busy>reorder).</p>
OBUONMAX-XXX	<p>Outgoing busy on time maximum.</p> <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 60 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'OBUONMAX-65'</pre> <p>Sets the outgoing busy on time maximum to .65 second (650 ms) (see NOTE for Send_Command 'OBUOFFMAX-XXX').</p> <p>For the code to work properly, ring, busy, and reorder time values must be set so that <i>ring</i> is greater than <i>busy</i>, and <i>busy</i> greater than <i>reorder</i> (ring>busy>reorder).</p>
OBUONMIN-XXX	<p>Outgoing busy on time minimum.</p> <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 40 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'OBUONMIN-50'</pre> <p>Sets the outgoing busy on time minimum to .5 second (500 ms) (see NOTE for Send_Command 'OBUOFFMAX-XXX').</p> <p>For the code to work properly, ring, busy, and reorder time values must be set so that <i>ring</i> is greater than <i>busy</i>, and <i>busy</i> greater than <i>reorder</i> (ring>busy>reorder).</p>

Timing System Send_Commands (Cont.)	
Command	Description
OREOFFMAX-XXX	<p>Outgoing reorder (fast busy) off time maximum.</p> <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 35 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'OREOFFMAX-45'</pre> <p>Sets the outgoing reorder (fast busy) off time maximum to .45 second (450 ms) (see NOTE for Send_Command 'OBUFFMAX-XXX').</p> <p>For the code to work properly, ring, busy, and reorder time values must be set so that <i>ring</i> is greater than <i>busy</i>, and <i>busy</i> greater than <i>reorder</i> (ring>busy>reorder).</p>
OREOFFMIN-XXX	<p>Outgoing reorder (fast busy) off time minimum.</p> <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 15 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'OREOFFMIN-20'</pre> <p>Sets the outgoing reorder (fast busy) off time minimum to .20 second (200 ms) (see NOTE for Send_Command 'OBUFFMAX-XXX').</p> <p>For the code to work properly, ring, busy, and reorder time values must be set so that <i>ring</i> is greater than <i>busy</i>, and <i>busy</i> greater than <i>reorder</i> (ring>busy>reorder).</p>
OREONMIN-XXX	<p>Outgoing reorder (fast busy) on time minimum.</p> <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 15 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'OREONMIN-20'</pre> <p>Sets the outgoing reorder (fast busy) on time minimum to .20 second (200 ms) (see NOTE for Send_Command 'OBUFFMAX-XXX').</p> <p>For the code to work properly, ring, busy, and reorder time values must be set so that <i>ring</i> is greater than <i>busy</i>, and <i>busy</i> greater than <i>reorder</i> (ring>busy>reorder).</p>
ORIOFFMAX-XXX	<p>Outgoing ring off time maximum.</p> <ul style="list-style-type: none"> • Time increment = 100 ms • Default at reset = 44 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'ORIOFFMAX-50'</pre> <p>Sets the outgoing ring off time maximum to 5.0 seconds (5,000 ms) (see NOTE for Send_Command 'OBUFFMAX-XXX').</p>
ORIOFFMIN-XXX	<p>Outgoing ring off time minimum.</p> <ul style="list-style-type: none"> • Time increment = 100 ms • Default at reset = 26 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'ORIOFFMIN-40'</pre> <p>Sets the outgoing ring off time minimum to 4.0 seconds (4,000 ms) (see NOTE for Send_Command 'OBUFFMAX-XXX').</p>

Timing System Send_Commands (Cont.)	
Command	Description
ORIONMAX-XXX	<p>Outgoing ring on time maximum.</p> <ul style="list-style-type: none"> • Time increment = 100 ms • Default at reset = 22 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'ORIONMAX-30'</pre> <p>Sets the outgoing ring on time maximum to 3.0 seconds (30,000 ms) (see NOTE for Send_Command 'OBUOFFMAX-XXX').</p>
ORIONMIN-XXX	<p>Outgoing ring on time minimum.</p> <ul style="list-style-type: none"> • Time increment = 100ms • Default at reset = 8 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'ORIONMIN-25'</pre> <p>Sets the outgoing ring on time minimum to 2.5 seconds (2,500 ms) (see NOTE for Send_Command 'OBUOFFMAX-XXX').</p>
PAUSE-XXX	<p>Set pause time for the comma (,) symbol in the Dial Send_Command (refer to 'DIAL-X-XXX-XXXX').</p> <ul style="list-style-type: none"> • Time increment = 100 ms • Default at reset = 20 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'PAUSE-25'</pre> <p>Sets pause time to 2.5 seconds (2500 ms).</p>
ROHOFFMAX-XXX ROHOFFMIN-XXX	<p>Receiver off-hook off time minimum or maximum.</p> <ul style="list-style-type: none"> • MAX and MIN time increment = 10 ms • MAX default at reset = 140 • MIN default at reset = 1 <p>Example:</p> <pre>SEND_COMMAND DTMF, 'ROHOFFMAX-65'</pre> <p>Sets the receiver off-hook off time minimum to .065 second (65 ms)</p> <pre>SEND_COMMAND DTMF, 'ROHOFFMIN-110'</pre> <p>Sets the receiver off-hook on time minimum to .11 second (110 ms)</p>
ROHONMAX-XXX ROHONMIN-XXX	<p>Receiver off-hook off time minimum or maximum.</p> <ul style="list-style-type: none"> • Time increment = 1 ms (firmware version 2.11 and lower) 10 ms (firmware version 2.12 and higher) • MAX default at reset = 140 (firmware version 2.11 and lower) 10 (firmware version 2.12 and higher) • MIN default at reset = 1 (firmware version 2.11 and lower) 10 (firmware version 2.12 and higher) <p>Example:</p> <pre>SEND_COMMAND DTMF, 'ROHONMAX-65'</pre> <p>Sets the receiver off-hook off time minimum to .065 second (65 ms)</p> <pre>SEND_COMMAND DTMF, 'ROHONMIN-110'</pre> <p>Sets the receiver off-hook on time minimum to .11 second (110 ms)</p>

Timing System Send_Commands (Cont.)	
Command	Description
TONE TIME-XXX	<p>Set length of each generated tone and time between tones in the Dial Send_Command (refer to 'DIAL-X-XXX-XXXX')</p> <ul style="list-style-type: none"> • Time increment = 1 ms • Default at reset = 100 ms <p>Example: <code>SEND_COMMAND DTMF, 'TONE TIME-100'</code></p> <p>Sets tone time length to .11 second (110 ms).</p>

Fine Tuning Send_Commands

The following table lists the commands that fine tune AXB-DTMF+ signal timing. Most likely, you will not have to change Fine Tuning parameters. The commands are listed alphabetically by operation and include syntax, syntax descriptions, usage examples, time increments, and reset default values.

Fine Tuning Send_Commands	
Command	Description
CPGAIN-OFF	<p>When off does not add gain (in addition to IGAIN) to dial tone call progress signal.</p> <p>Default at reset = YES</p> <p>Example: <code>SEND_COMMAND DTMF, 'CPGAIN-OFF'</code></p> <p>Sets gain into call progress detector chip as default.</p>
CPGAIN-ON	<p>When on adds gain (in addition to IGAIN) to dial tone call progress signal.</p> <p>Default at reset = NO</p> <p>Example: <code>SEND_COMMAND DTMF, 'CPGAIN-ON'</code></p> <p>Sets gain into call progress detector chip as default.</p>
IGAIN-OFF	<p>Controls gain of "internal signals" on the AXB-DTMF+. The internal signals are call progress tones such as incoming DTMF, receiver off-hook, and called number is busy. Setting gain to "off" causes it to return to default level.</p> <p>Default at reset = YES</p> <p>Example: <code>SEND_COMMAND DTMF, 'IGAIN-OFF'</code></p> <p>Sets internal gain on AXB-DTMF+ to default.</p>
IGAIN-ON	<p>Controls gain of "internal signals" on AXB-DTMF+. The internal signals are call progress tones such as incoming DTMF, receiver off-hook, and called number is busy. Setting gain to "on" increases gain above default level. This may be helpful if signals are not being detected due to attenuation over the phone line.</p> <p>Default at reset = NO</p> <p>Example: <code>SEND_COMMAND DTMF, 'IGAIN-ON'</code></p> <p>Sets internal gain on the AXB-DTMF+ to high.</p>

Distinctive Ring Patterns and Send_Commands

Distinctive ringing is a service provided by the local telephone company. Distinctive ring allows additional phone numbers to be assigned to a single phone line. Then, depending upon the number dialed, the ringing pattern is different.

The AXB-DTMF+ can identify up to four distinctive ring default patterns. Default time values for each pattern are shown in FIG. 1. A pattern consists of five parts. Depending on the ring pattern, a part is either high or low. The distinctive ring patterns shown illustrate the envelope of the incoming ring with respect to time. The four default patterns are:

- **Default Pattern 1:** 1 long ring lasting 2 seconds followed by 4 seconds of silence.
- **Default Pattern 2:** 2 rings, in a 2 second period, followed by 4 seconds of silence.
- **Default Pattern 3:** 2 short rings and 1 long ring, in a 2 second period, followed by 4 seconds of silence.
- **Default Pattern 4:** 1 short, 1 long, and 1 short ring, within a 2 second period, followed by 4 seconds of silence.

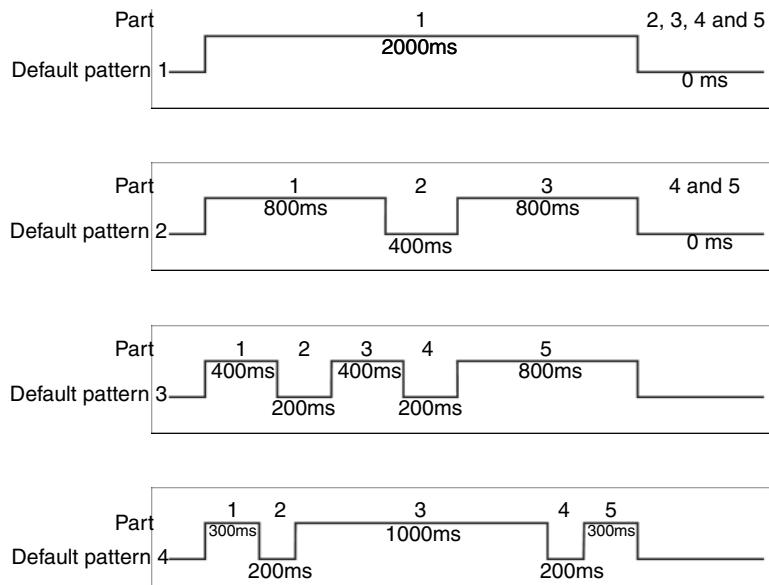


FIG. 1 DTMF+ distinctive ring default patterns and time values



Time values are in milliseconds (1000 ms equals 1 second). All 4 distinctive ring patterns are within a 2-second period from start to end time, for most applications. If you plan to change any of the distinctive ring patterns, it is advisable to stay within a 2 second time frame for each distinctive ring pattern.

Changing a Default Ring Pattern

Change a default ring pattern using the appropriate Send_Command when programming the AXB-DTMF+. Each ring pattern consists of five parts with each part having a specific Send_Command. For more information on distinctive ring Send_Commands, refer to Distinctive Ring Send_Commands.

Example:

Pattern 4's five parts are as follows:

- Part 1 is high and 300 ms (.3 seconds) long (ring).
- Part 2 is low and 200 ms (.2 seconds) long (no ring).
- Part 3 is high and 1000 ms (1 seconds) long (ring).
- Part 4 is low and 200 ms (.2 seconds) long (no ring).
- Part 5 is high and 300 ms (.3 seconds) long (ring).

If you want to change the time values of Parts 2 and 4 (no ring) of Pattern 3:



NOTE

Values specified are in increments of 10 ms. That is, a value of 1 yields 10 ms, while a value of 100 yields 100 x 10 ms, or 1 second.

1. To change Part 2 of Pattern 3, use the Send_Command 'P3_2-XXX' where:

- Time increment = 10 ms
- Default at reset = 20 (20 x 10 ms = 200 ms)

For example, issue the Send_Command

```
SEND_COMMAND DTMF, 'P3_2-25 ' (25 x 10 ms = 250 ms)
```

to change Part 2 of Pattern 3 from a value of 200 ms (.2 seconds) to 250 ms (.250 seconds).

2. To change Part 4 of Pattern 3, use the Send_Command 'P3_4-XXX' where:

- Time increment = 10 ms
- Default at reset = 20 (20 x 10ms = 200ms)

For example, issue the Send_Command

```
SEND_COMMAND DTMF, 'P3_4-25 ' (25 x 10ms = 250ms)
```

to change Part 4 of Pattern 3 from a value of 200 ms to (.2 seconds) to 250 ms (.250 seconds).

3. The normal length of time from the start of any pattern to its end time is usually 2- seconds. If you increase the time value for any part of a pattern, make sure to decrease another part by the same amount, maintaining the 2- seconds overall time for the pattern. For example, if you increased the value of Parts 2 and 4 of Pattern 3 by 5 ms each, decrease Part 3 by 10 ms.

Distinctive Ring Send_Commands

The following Send_Commands are available for changing the default distinctive ring patterns. Each ring pattern consists of five parts with each part requiring a Send_Command.

Distinctive ring Send_Commands produce four patterns (P1 through P5) and high and low time values (_X). Refer to FIG. 1 on page 15 to see the timing diagram based on defaults at start-up/reset.

Distinctive Ring Send_Commands	
Command	Description
P1_1-XXX	Pattern 1 Part 1 high time for distinctive ring. <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 200 Example: <code>SEND_COMMAND DTMF, 'P1_1-300'</code> Sets the distinctive ring Pattern 1 Part 1 high time for 3.0 seconds (3000 ms).
P1_1-XXX	Pattern 1 Part 1 high time for distinctive ring. <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 200 Example: <code>SEND_COMMAND DTMF, 'P1_1-300'</code> Sets the distinctive ring Pattern 1 Part 1 high time for 3.0 seconds (3000 ms).
P1_2-XXX	Pattern 1 Part 2 low time for distinctive ring. <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 0 Example: <code>SEND_COMMAND DTMF, 'P1_2-05'</code> Sets the Pattern 1 Part 2 low time for .05 seconds (50 ms).
P1_3-XXX	Pattern 1 Part 3 high time for distinctive ring. <ul style="list-style-type: none"> • X=(Time increment) = 10 ms • Default at reset = 0 Example: <code>SEND_COMMAND DTMF, 'P1_3-05'</code> Sets the Pattern 1 Part 3 high time for .05 seconds (50 ms).
P1_4-XXX	Pattern 1 Part 4 low time for distinctive ring. <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 0 Example: <code>SEND_COMMAND DTMF, 'P1_4-05'</code> Sets the Pattern 1 Part 4 low time for .05 seconds (50 ms).
P1_5-XXX	Pattern 1 Part 5 high time for distinctive ring. <ul style="list-style-type: none"> • Time increment = 10 ms • Default at reset = 0 Example: <code>SEND_COMMAND DTMF, 'P1_5-05'</code> Sets the Pattern 1 Part 5 high time for .05 seconds (50 ms).

Distinctive Ring Send_Commands (Cont.)	
Command	Description
PY_Z-XXX	<p>The remaining Ring Patterns and Parts Send_Commands are used just like the examples shown for Pattern 1 above. Refer to Figure 12 and the following information.</p> <ul style="list-style-type: none"> • Y = Pattern number • Z = Part number • X = Time increment

Access Program Example

To program the AXB-DTMF+, you will need a personal computer with the Access software program, an Access Central controller, an AXlink power/data cable, as well as an CC-COM Access programming cable. For the program example, complete the following steps:

1. Create a new Access program. Then, add the following Access programming data from the following example into the Define_Start section of the new Access program.
2. Compile the Access program and download it to the central controller to program the AXB-DTMF+.

```

PROGRAM_NAME=' REDIAL '
(*  DATE:04/15/96   TIME:15:04:04   *)
(*****
(*  REDIAL.AXS                               *)
(*  THIS PROGRAM IMPLEMENTS AN AUTOMATIC DIALER THAT DIALS          *)
(*  A NUMBER IN RESPONSE TO A BUTTON PUSH ON A KEYPAD.  IF THE     *)
(*  NUMBER IS BUSY, THE USER IS NOTIFIED VIA A RS232 TERMINAL      *)
(*  ATTACHED TO THE SERIAL PORT ON THE MASTER, AND THE CARD        *)
(*  WILL RETRY 6 ADDITIONAL TIMES AT 5 SECOND INTERVALS.  IF THE  *)
(*  DIALED NUMBER RINGS, THE USER WILL BE NOTIFIED VIA A RS232     *)
(*  TERMINAL ATTACHED TO THE SERIAL PORT ON THE MASTER             *)
(*                                                                    *)
(*  NOTE THAT TO DEMO THIS PROGRAM,  A MASTER,  A AXB-DTMF+,      *)
(*  A PC RUNNING ACCESS, AND A PHONE LINE ARE ALL THAT ARE         *)
(*  NECESSARY (IN ADDITION TO AN ACCESS CARDFRAME).                *)
(*                                                                    *)
(*  MODIFY THIS PROGRAM WHERE THE COMMENT "(* INSERT DESIRED      *)
(*  NUMBER HERE IN PLACE OF 555-1212 *)" IS WRITTEN.  REPLACE THE  *)
(*  NUMBER 555-1212 WITH THE NUMBER THAT IS DESIRED TO BE CALLED. *)
(*                                                                    *)
(*  AFTER THE PROGRAM HAS BEEN DOWNLOADED TO THE                   *)
(*  MASTER CARD, HIGHLIGHT THE LINE "PUSH[128,1]" AND PRESS        *)
(*  CONTROL 'A ' ON THE PC KEYBOARD.  THEN, PRESS F4 TO ENTER THE *)
(*  TERMINAL PROGRAM.  PROGRESS MESSAGES FROM THE MASTER          *)
(*  SHOULD BE SEEN.                                                *)
(*****
(*****
(*  DEVICE NUMBER DEFINITIONS GO BELOW                               *)
(*****
DEFINE_DEVICE
DTMF_CARD = 96                                     (*  AXB-DTMF+  *)
(*****

```

▼ Continued

```

(*          CONSTANT DEFINITIONS GO BELOW          *)
(*****
DEFINE_CONSTANT

(*****
(*          VARIABLE DEFINITIONS GO BELOW          *)
(*****
DEFINE_VARIABLE
STATE          (* STATE OF THE SOFTWARE "STATE MACHINE" *)
BUSY_COUNT     (* NUMBER OF RETRIES *)

(*****
(*          LATCHING DEFINITIONS GO BELOW          *)
(*****
DEFINE_LATCHING

(*****
(*          MUTUALLY EXCLUSIVE DEFINITIONS GO BELOW          *)
(*****
DEFINE_MUTUALLY_EXCLUSIVE
(*          STARTUP CODE GOES BELOW          *)
(*****
DEFINE_START
BUSY_COUNT=0
STATE=255     (* ESSENTIALLY "NO STATE" *)
(*****
(*          THE ACTUAL PROGRAM GOES BELOW          *)
(*****
DEFINE_PROGRAM
(*****
(*          IF KEY 1 ON THE KEYPAD IS PUSHED, PLACE THE          *)
(*          CARD ON HOOK (IN CASE IT WAS OFF-HOOK).          *)
(*          WAIT 2 SECONDS BEFORE CHANGING STATE TO          *)
(*          STATE 2.          *)
(*****
PUSH[128,1]          (* 1 *)

{
SEND_COMMAND DTMF_CARD, 'ON HOOK'
WAIT 20
STATE=2
}
(*****
(*          TAKE THE CARD OFF-HOOK. WAIT 2 SECONDS          *)
(*          FOR DIAL TONE. IF IT IS ( NOT RECEIVED, SEND AN          *)
(*          ERROR MESSAGE AND SHUT DOWN (GO TO ( "NO STATE").          *)
(*****

```

↓ Continued

```

IF (STATE=2)
{
    STATE=3
    SEND_COMMAND DTMF_CARD, 'OFF-HOOK'
    WAIT 20 'WAIT FOR DIAL TONE'

    {
        SEND_STRING 0, " 'ERROR: NO DIAL TONE', 13, 10"
        SEND_COMMAND DTMF_CARD, 'ON HOOK'
        STATE=255
    }
}

(*****
(*      IF DIAL TONE IS RECEIVED, DIAL THE NUMBER          *)
*****)

IF (STATE=3)
{
    PUSH[DTMF_CARD, 47] (*DIAL_TONE*)
    {
        CANCEL_WAIT 'WAIT FOR DIAL TONE'
        SEND_COMMAND DTMF_CARD, 'DIAL 555-1212' (* INSERT DESIRED
        NUMBER HERE IN PLACE OF 555-1212 *)
        STATE=4
    }
}

(*****
(*      IF 12 SECONDS PASS AND THERE IS NO BUSY OR RINGING, SEND          *)
(*      AN ( ERROR MESSAGE AND SHUT DOWN (GO TO "NO STATE").              *)
*****)

IF (STATE=4)
{
    STATE=5
    WAIT 120 'WAIT FOR RESPONSE TO DIAL'
    {
        SEND_STRING 0, " 'ERROR: NO RESPONSE TO DIAL', 13, 10"
        SEND_COMMAND DTMF_CARD, 'ON HOOK'
        STATE=255
    }
}

(*****
(*      IF THE DIALED NUMBER IS BUSY, SEND A MESSAGE INDICATING          *)
(*      SUCH ( AND GO TO STATE 6. IF THE DIALED NUMBER IS RINGING,        *)
(*      INDICATE SUCH AND SHUT DOWN (GO TO "NO STATE").                  *)
*****)

```

↓ Continued


```

IF (STATE=5)
{
    PUSH[DTMF_CARD,34] (*OUTGOING_BUSY*)
    {
        CANCEL_WAIT 'WAIT FOR RESPONSE TO DIAL'
        SEND_COMMAND DTMF_CARD, 'ON HOOK' (*NUMBER IS
        BUSY SO HANG UP*)
        SEND_STRING 0, "'DIALED NUMBER IS BUSY',13,10"
        STATE=6
    }

    PUSH[DTMF_CARD,35] (*OUTGOING_RING*)
    {
        CANCEL_WAIT 'WAIT FOR RESPONSE TO DIAL'
        SEND_STRING 0, "'REMOTE PHONE RINGING',13,10"
        BUSY_COUNT=0
        STATE=255
    }
}

(*****
*) IF THE DIALED NUMBER WAS BUSY, INCREMENT THE *)
*) "BUSY_COUNT".IF THIS IS NOT THE 7TH RETRY, WAIT 5. *)
*) SECONDS AND TRY AGAIN ELSE, SHUT DOWN (GO TO "NO *)
*) STATE"). *)
(*****)

IF (STATE=6)
{
    BUSY_COUNT = BUSY_COUNT+1
    STATE=255
    IF (BUSY_COUNT<7)
    {
        WAIT (50)
        STATE=2
    }
}
ELSE
{
    SEND_STRING 0, "'MAXIMUM RETRIES HAS BEEN REACHED',13,10"
    BUSY_COUNT=0
}
}

(*****
*) END OF PROGRAM *)
*) DO NOT PUT ANY CODE BELOW THIS COMMENT *)
(*****)

```

Channel Codes

Channel codes on the AXB-DTMF+ are stored in memory (firmware) and process all outbound or inbound DTMF from a set of program instructions downloaded to the Axxess Central controller.

Channel Codes		
Operation	Channel #	Description (ON Indicates)
DTMF Tones	1-16	<p>Outbound tones are produced by the AXB-DTMF+ by Send_Commands received from the Axxess Central controller to dial a phone number or send a sequence of DTMF codes over the phone line.</p> <p>Tones are also generated directly by activating the device channel corresponding to the tone. A tone is played as long as a channel is on. Only one tone may be active at a time. If a second channel is activated while another is on, this causes the first tone to stop and the second tone to play.</p> <p>The following channels generate DTMF code:</p> <ul style="list-style-type: none"> • Channel 1 = 1 • Channel 2 = 2 • Channel 3 = 3 • Channel 4 = 4 • Channel 5 = 5 • Channel 6 = 6 • Channel 7 = 7 • Channel 8 = 8 • Channel 9 = 9 • Channel 10 = 0 • Channel 11 = * • Channel 12 = # • Channel 13 = A • Channel 14 = B • Channel 15 = C • Channel 16 = D
Detection	17-32	<p>Detects DTMF "in" from an extension or phone.</p> <p>Refers to any inbound DTMF transmitted (forwarded) to the Axxess AXC-EM Enhanced Master Card by the AXB-DTMF+, as generated by any external touch-tone phone.</p> <p>The following DTMF codes are reported to the Axxess AXC-EM Enhanced Master Card on the push and release of a touch-tone telephone button.</p> <ul style="list-style-type: none"> • Channel 17 = 1 • Channel 18 = 2 • Channel 19 = 3 • Channel 20 = 4 • Channel 21 = 5 • Channel 22 = 6 • Channel 23 = 7 • Channel 24 = 8 • Channel 25 = 9 • Channel 26 = 0 • Channel 27 = * • Channel 28 = # • Channel 29 = A • Channel 30 = B • Channel 31 = C • Channel 32 = D
	34	<p>Indicates outgoing busy signal.</p> <p>Call Progress Reporting returned to the Axxess AXC-EM when a busy signal is detected. During Call Progress Reporting, the system is responsible for any subsequent action following a progress indication.</p>
	35	<p>Indicates outgoing ring signal.</p> <p>Call Progress Reporting returned to the Axxess AXC-EM when a ring signal is detected.</p>
	36	Indicates incoming ring signal (each burst indicated).
	37	Indicates AXB-DTMF+ is off-hook.
	38	Indicates extension phone is off-hook.

Channel Codes (Cont.)		
Operation	Channel #	Description (ON Indicates)
Detection (Cont.)	39	Indicates a momentary loss of loop current (call termination). Call Progress Reporting returned to the Access AXC-EM when call termination is detected. Detection of call termination (other end hung up) is usually provided by the telephone company and is activated by a momentary loss of loop current. However, if this is not available, the DTMF+ is triggered by the receiver off-hook tone which occurs approximately 1 minute after call termination.
	40	Indicates receiver off-hook tone. Call Progress Reporting returned to the Access AXC-EM when a receiver off-hook is detected.
	45	Indicates time out while waiting for the dial tone during a wait (W) in the Dial Send_Command.
	47	Indicates dial tone presence.
Distinctive Ring	41-44	The AXB-DTMF+ provides report capability for the type of ring received. Distinctive ringing is a service that must be obtained from the telephone company. This service allows the same telephone line to be reached by dialing different telephone numbers. The receiving telephone then rings in a distinctive manner according to the number dialed. The AXB-DTMF+ provides 4 distinctive ring type patterns. These default patterns can be changed and are as follows:
	41	Default Pattern 1 The first ring lasts 2 seconds followed by 4 seconds of silence.
	42	Default Pattern 2 There are 2 long rings in a 2 second period followed by 4 seconds of silence.
	43	Default Pattern 3 There are 2 short then 1 long ring in a 2 second period followed by 4 seconds of silence.
	44	Default Pattern 4 There is 1 short, 1 long, and 1 short ring within a 2 second period followed by 4 seconds of silence.

Caller ID

The AXB-DTMF+ provides report capability for receiving Caller ID information. The following table shows the Caller ID data string sent to the Access AXC-EM Enhanced Master Card. A description and format use are also described.

Caller ID	
Data String	Description
"CLID-mmddhhii-nnnnnnnnnn-<text>',0"	<p>Caller ID data string sent from the AXB-DTMF+ to the central controller. Caller ID is a service obtained from the telephone company and is passed from the central office between the first and second incoming ring.</p> <p>Characters in this string are not literal ASCII except 'CLID' and '-' characters. All other characters in the string are represented as follows:</p> <ul style="list-style-type: none"> • m = month • d = day • h = hour • l = min • n = phone number • text = 0 to 20 characters <p>The string is always 48 bytes including the null character. Spaces (0x20) are used as filler in the text field or for any field not received.</p>

Program Example for Caller ID

Program the AXB-DTMF+ for Caller ID using the Access software program as described in Access Program Example.



NOTE

For the program to work, Caller ID service must be provided from your local telephone company.

The following is an Access program example for Caller ID.

```

PROGRAM_NAME='DTMF+ CALLER-ID SAMPLE'
(* DATE:07/29/96 TIME:15:15:53 *)
Figure 17
ACCESS Caller ID program example
(*****
(* *)
(* THIS PROGRAM RECEIVES CALLER-ID INFORMATION IN THE FORM *)
(* OF A STRING FROM AN INCOMING CALL (VIA AXB-DTMF+). IT *)
(* THEN DISPLAYS IT ON FOUR BUTTONS ON A TOUCHPANEL AND *)
(* ALSO ON A DISPLAY TERMINAL HOOKED UP TO THE MASTER *)
(* CARD'S PROGRAM PORT. *)
(* *)
(* JUST CREATE FOUR VARIABLE TEXT BUTTONS ON A TOUCHPANEL *)
(* WITH VARIABLE TEXT NUMBERS 1, 2, 3, AND 4 AND SEE THE *)
(* CALLER-ID INFORMATION APPEAR. OR, YOU CAN WATCH THE *)
(* DATA ON YOUR PC SCREEN. SELECT <CTRL>-T TO ENTER *)
(* ACCESS' TERMINAL MODE TO SEE THE DATA APPEAR. *)
(* *)

```

↓ Continued

```

(* THE DATA SHOULD APPEAR BETWEEN THE FIRST AND SECOND          *)
(* RING.                                                            *)
(*                                                                  *)
(*****                                                            *)
(*          DEVICE NUMBER DEFINITIONS GO BELOW                      *)
(*****                                                            *)
DEFINE_DEVICE

DTMF = 96      (* AXB-DTMF+  V X.XX                                *)
TP   = 128    (* TOUCHPANEL                                       *)
(*****                                                            *)
(*          CONSTANT DEFINITIONS GO BELOW                          *)
(*****                                                            *)
DEFINE_CONSTANT

(*****                                                            *)
(*          VARIABLE DEFINITIONS GO BELOW                          *)
(*****                                                            *)
DEFINE_VARIABLE
DTMF_BUFFER[100]          (* INCOMING DATA FROM DTMF CARD          *)
ID_DATA[100]              (* CALLER-ID COPY OF ABOVE               *)
ID_DATE[5]                (* CALLER-ID DATE                        *)
ID_TIME[5]                (* CALLER-ID TIME                        *)
ID_NUMBER[12]            (* CALLER-ID NUMBER                      *)
ID_NAME[20]              (* CALLER-ID NAME                        *)

(*****                                                            *)
(*          LATCHING DEFINITIONS GO BELOW                          *)
(*****                                                            *)
DEFINE_LATCHING

(*****                                                            *)
(*          MUTUALLY EXCLUSIVE DEFINITIONS GO BELOW               *)
(*****                                                            *)
DEFINE_MUTUALLY_EXCLUSIVE

(*****                                                            *)
(*          SUBROUTINE DEFINITIONS GO BELOW                        *)
(*****                                                            *)

(*****                                                            *)
(*          STARTUP CODE GOES BELOW                               *)
(*****                                                            *)
DEFINE_START

CREATE_BUFFER DTMF,DTMF_BUFFER          (* START LISTENING TO THE CARD *)

(*****                                                            *)
(*          THE ACTUAL PROGRAM GOES BELOW                         *)
(*****                                                            *)

```

↓
Continued

```

DEFINE_PROGRAM

IF (FIND_STRING(DTMF_BUFFER, 'CLID-',1))          (* START OF STRING FOUND *)
{
  WAIT 20 'NO VALID STRING FOUND'              (* TIME-OUT AFTER 2.0 SECONDS *)
  {
    CANCEL_WAIT_UNTIL 'WAIT FOR END OF STRING' (* DON'T WAIT FOR THE REST *)
    CLEAR_BUFFER DTMF_BUFFER                   (* CLEAR DATA IN BUFFER *)
    SEND_STRING 0, "'INCOMPLETE STRING RECEIVED',10,13" (* ERROR MESSAGE *)
  }

  WAIT_UNTIL (FIND_STRING(DTMF_BUFFER, "$00",1)) (* END OF STRING FOUND *)
  {
    CANCEL_WAIT 'NO VALID STRING FOUND'        (* NO TIME-OUT NECESSARY *)
    ID_DATA = DTMF_BUFFER                      (* COPY CONTENTS, SO MORE DATA *)
                                              (* WILL NOT AFFECT PROCESSING *)
    CLEAR_BUFFER DTMF_BUFFER                  (* CLEAR DATA IN BUFFER *)

                                              (* PROCESS THE DATA FOUND *)
    ID_DATE  = "MID_STRING(ID_DATA,6,2) , '/' , MID_STRING(ID_DATA,8,2) "

    ID_TIME  = "MID_STRING(ID_DATA,10,2) , ':' , MID_STRING(ID_DATA,12,2) "

    ID_NUMBER = "MID_STRING(ID_DATA,15,3) , '-' ,
                MID_STRING(ID_DATA,18,3) , '-' , MID_STRING(ID_DATA,21,4) "

    ID_NAME   = MID_STRING(ID_DATA,26,20)

    (*      NOTE: THE FOLLOWING DATA WILL APPEAR ON THE TOUCHPANEL      *)
    SEND_COMMAND TP, "'TEXT1-NAME: ' , ID_NAME"          (* CALLER'S NAME *)
    SEND_COMMAND TP, "'TEXT2-NUMBER: ' , ID_NUMBER"      (* CALLER'S NUMBER *)
    SEND_COMMAND TP, "'TEXT3-DATE: ' , ID_DATE"          (* DATE OF THE CALL *)
    SEND_COMMAND TP, "'TEXT4-TIME: ' , ID_TIME"          (* TIME OF THE CALL *)
    (*      NOTE: THE FOLLOWING DATA WILL APPEAR IN THE TERMINAL EMULATOR      *)
    SEND_STRING 0, "'NAME: ' , ID_NAME,10,13"            (* CALLER'S NAME *)
    SEND_STRING 0, "'NUMBER: ' , ID_NUMBER,10,13"        (* CALLER'S NUMBER *)
    SEND_STRING 0, "'DATE: ' , ID_DATE, ' (MONTH/DATE) ' ,10,13" (* DATE OF CALL *)
    SEND_STRING 0, "'TIME: ' , ID_TIME,10,13"            (* TIME OF CALL *)
  }
}

(*****
(*      END OF PROGRAM      *)
(*      DO NOT PUT ANY CODE BELOW THIS COMMENT      *)
(*****)

```




AMX reserves the right to alter specifications without notice at any time.

brussels • dallas • los angeles • mexico city • philadelphia • shanghai • singapore • tampa • toronto • york
3000 research drive, richardson, TX 75082 USA • 469.624.8000 • 800.222.0193 • fax 469.624.7153 • technical support 800.932.6993

032-004-1334 5/02 ©2002 AMX Corporation. All rights reserved. AMX, the AMX logo, the building icon, the home icon, and the light bulb icon are all trademarks of AMX Corporation. AMX reserves the right to alter specifications without notice at any time. In Canada doing business as Panja Inc.